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# **The Clean-up of Contaminated Military Sites, Consequences for a Pollution Prevention Approach, Requirements from a Viewpoint of Environmental Protection**

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## **1. Background and Terms of Reference**

This seminar is held as a follow up of the NATO Study on "Environmental Technologies" which was concluded in September 1996.

Focus of this study was

- to get a better understanding of contamination from military sources,  
to identify existing or evolving technologies and strategies to minimize environmental impacts of military operations and its areas for potential application in the military
- to identify research and development activities which may be required in the future.

The study was focused on the following substances:

- Petroleum, Oil and Lubricants (POLs)
- Munitions, Energetics, and Propellants
- Ozone Depleting Substances (ODS), Fire Suppressants and Refrigerants
- Volatile Organic Compounds (VOCs), Solvents and Surface Cleaners
- Inorganic Surface Coatings
- Organic Surface Coatings
- Shipboard Liquid Waste
- Shipboard Solid Waste
- Pesticides

The military and the environment is a fascinating issue, since this is almost the only field in modern societies, where there is a certain prerogative when it comes to environmental protection, to environmental information and to environmental action. Additionally the military loves to have an aura of secrecy around what it does and, there are rumors also around what it does not do. It is encouraging to see that there is a growing concern about the environmental impacts of peacetime military operations. And the whole setting of this study is fascinating, since it produces a déjà vue feeling at least for people who look at it from a view point of environmental administrations.

## **2. The Findings of the NATO CCMS Pilot Study on the Environmental Aspects of Reusing Former Military Lands**

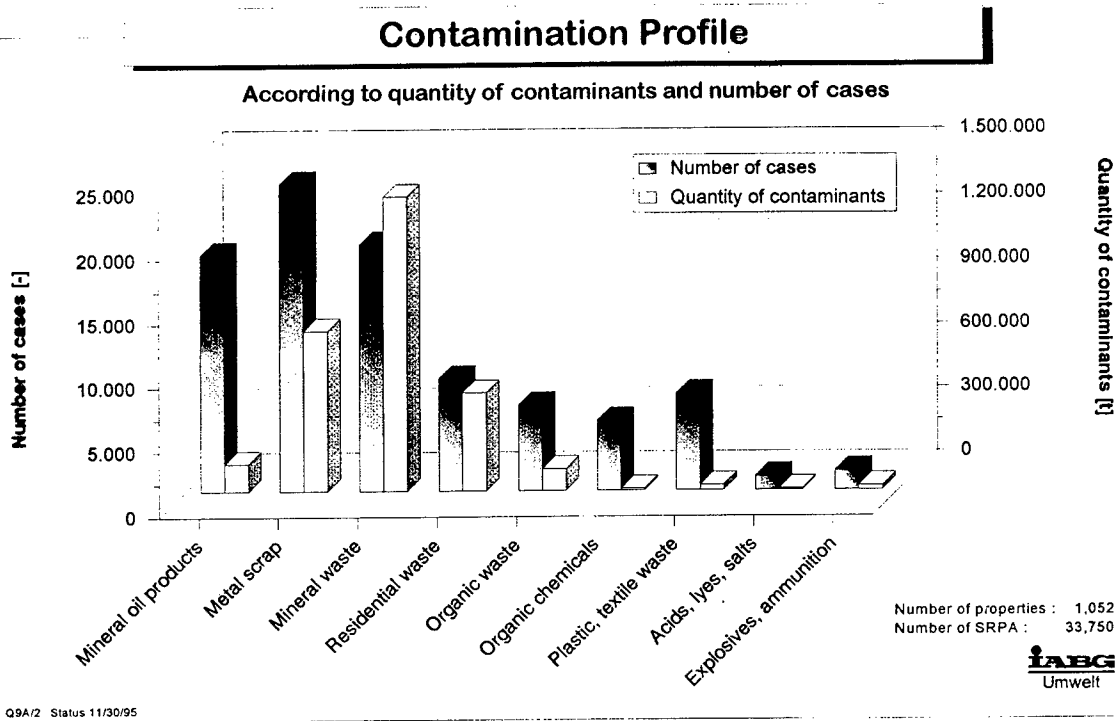
Parallel a NATO CCMS Pilot Study on Environmental Aspects of Reusing Former Military Lands was executed and co-chaired by the USA and Germany. Phase I of this Study was also terminated at the end of 1996. Its terms of reference for Phase I called for the creation and enhancement of national capacity and capability to effectively address environmental aspects of conversion in particular:

- organizational planning approaches,
- personnel requirements,
- methodologies and processes,
- planning, programming and budgeting,
- remediation strategies and technologies,
- cost-benefit analysis,
- execution and execution oversight.

Much effort was spent on categorizing the most important pollutants found in cleaning up former military site, to describe the impact of these pollutants on military lands and to produce a link to existing state-of-the-art remediation technologies. Not everything related to this CCMS pilot study is of relevance for the subject of pollution prevention at military bases, some of its findings definitely are.

Great effort was put in assessing pollution found at military sites and putting this information together. Table 1 gives a summary of typical contaminants found at former Russian military sites in Germany and the amount of cases.

Table 1 Suspected Contamination Areas by Type and Quantity of Contamination and by Number of Cases  
(Russian sites in Germany)



The groups listed here do not completely correspond with the substances subject of the study on pollution prevention. This has obvious reasons. The "Reuse Study" mainly looked at soil and groundwater pollution at former military sites. Volatile compounds were not of special interest here. Shipboard wastes were not covered by the „Reuse Study“.

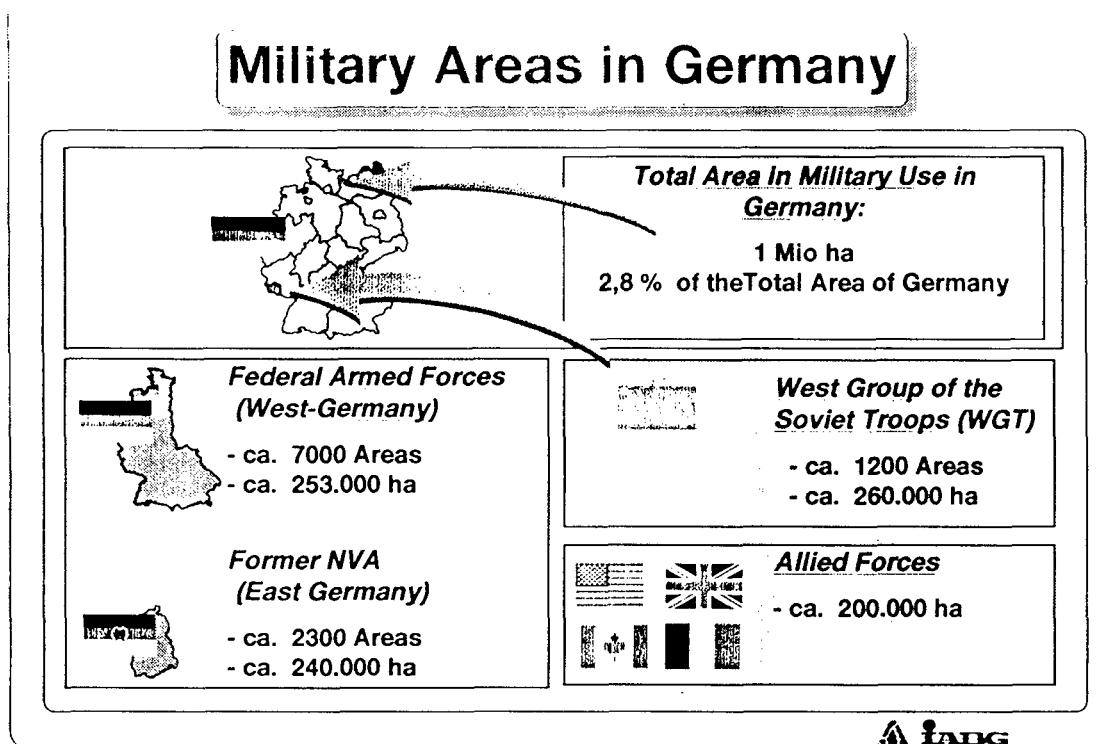
Regarding the other substances it is quite obvious that these also contribute to environmental problems at military sites, though to a quite different extent. Leaving aside cases of improper waste management the study quite clearly shows that particularly POLs and organic chemicals are responsible for by far most of the cases of contamination of land. Since these substances are not used in "open systems" it is also obvious, that losses are the result of poor design and maintenance of the systems and of careless or negligent usage of these substances.

Germany has quite a bit of experience in assessing environmental damage at military sites. Up to its reunification it had the highest density of military in the World, altogether about 2 million man under arms, occupying a territory of over 2 millions hectares.

It was not only German military from the eastern and from the western part of Germany, but also Russian military, US, British, French, Canadian, Belgium and Dutch military stationed for a long period in Germany.

Figure 1 gives an overview over the amount of land used for the military and the number of troops stationed in Germany during the "cold war" time. The numbers there will be reduced to half once the process of reducing the military and returning sites for civilian use will be finalized.

Fig. 1 Military Use of Land During the "Cold War" in Germany



Now that many of military sites and installations are given up and returned to the German government, it was a challenge to compare the kinds of environmental damage that could be found at facilities managed by different nations. The outcome of this comparison was stunning.

The substances causing damage and the kinds of damage were the same whichever was the country whose army was tenant at the facility. If at all there were gradual differences in the extent to which the military was negligent with hazardous substances, the substances as such and the places of contamination are in principle the same, whether Russian or American, whether German or French.

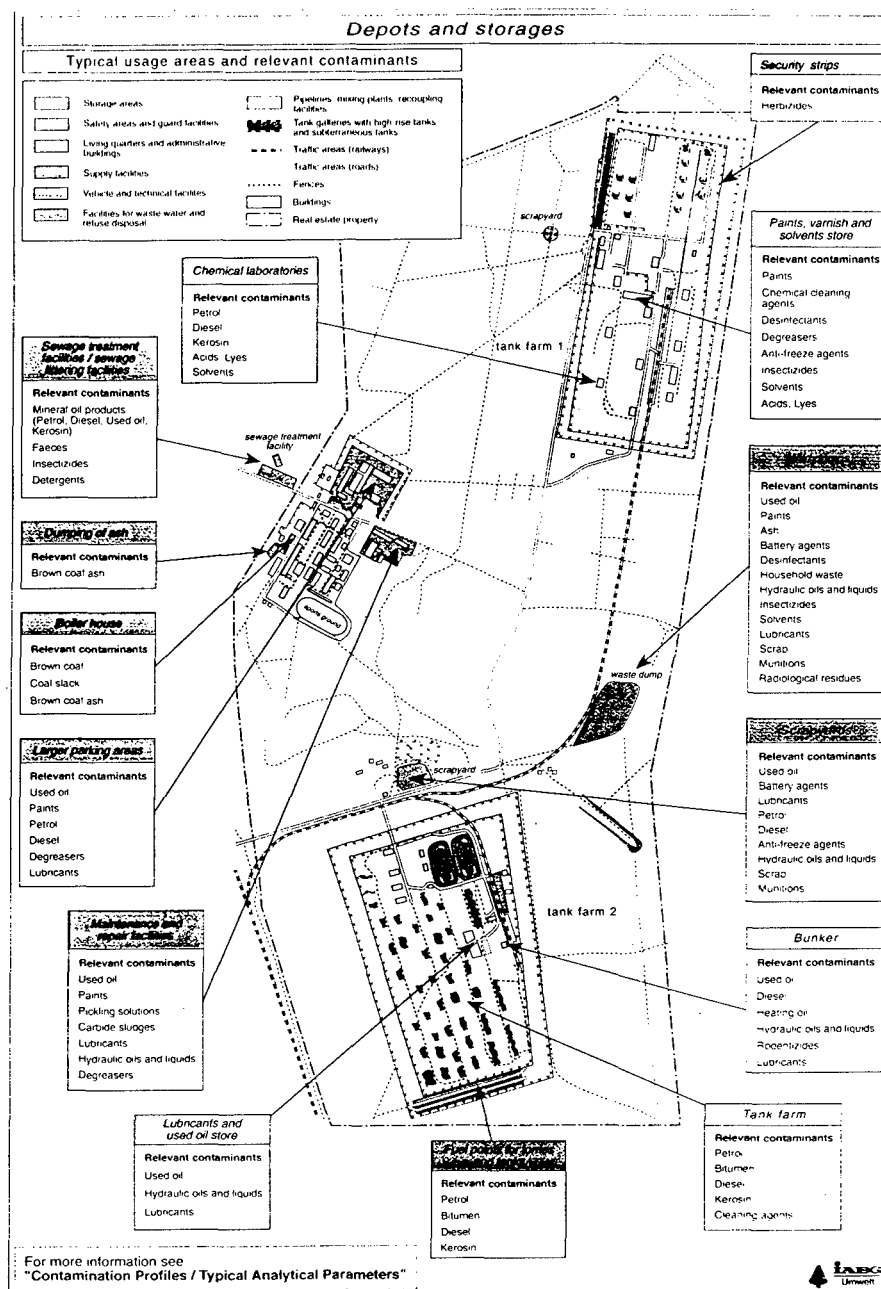


Fig. 2 Example of a „Contamination Profile“

### 3. Cross Referencing the Studies

It is very interesting to see that although there was not very much cross-referencing between these two studies the study on Environmental Technologies was focusing on Pollutants which have been identified as being typical for environmental impacts on military lands.

One may think that this is quite natural since after all there were expert groups dealing with the issues and perhaps it is quite natural indeed, after all it is encouraging to see that the work of two independently operating working group comes to similar conclusions when cross referenced. The study on „Environmental Technologies“ gives an excellent coverage of the relevant pollutants in military use. Pinpointing the problem however, does not solve it. Although there cannot be disagreement on the selection of pollutants for the long term scientific study there may be different ways to look at the lessons to be learned.

One lesson is obvious and backed by both studies. The military still has quite a substantial pollution potential, even if everything possible is done to keep hazardous material as much in closed circuits as possible. Very often the state of the art - as practiced in the „civil“ World apparently has not been accepted for military use.

It can only be hoped that a powerful organization like NATO which through its sub organizations has a lot of environmental studies ongoing will after 50 years of existence create policy mechanisms to make best use of the findings of such studies. Until now it is apparently exclusively up to the individual member state to draw its own and specific conclusions. The outcome of the studies will therefore not directly be used within the NATO framework. This is very unfortunate since the systems should be interchangeable and since the market for military goods is rather limited and the most powerful suppliers may be the least interested to draw the necessary conclusions. Some mechanism to avoid this from happening should be envisaged.

Another point is obvious: There are different groups of polluting substances used by the military which can be categorized in different ways. The grouping to organize this work was use oriented following the chemical specifics. If you look on the substances and how to tackle them in a more policy oriented way you may come to the different groupings:

There are for example substances in use by the military and the general public likewise (in the same manner). This is the case for most of the fuels and lubricants (POLs) (for aircraft, vessel and motor vehicles). This group of substances also comprises the VOCs, the Surface Coatings whether organic or inorganic, the Pesticides and to a large extent also the shipboard waste.

The Rest of the groups is "military only". In this group you will find the ODSs, not as such but in the kind of way it is used by the military and the Munitions, Energetics, and Propellants.

What is the advantage of such a categorization? It opens a door to comparing what is going on in the rest of the World, i.e. the civil World. Following such an approach will make it more natural for the military to accept and put into military practice what is developed for the civil World and working perfectly well there.

The current argument against taking this approach is generally cost and secondly specification. Both of these arguments have to be looked at very carefully before they are taken aboard.

The cost argument is an argument that cannot be accepted. If cost is not an argument for the civil sector, then it cannot be an argument for the military to resist certain developments or demands. It has to be born in mind that the military is part of the government administration of the countries and in this function it has to provide leadership also in environmental protection.

The often made request for transition periods is quite acceptable. Transition periods are always needed when stocks have to be replaced or when certain equipment has to be put out of service.

So in principle there should be agreement, that what is possible for the civilian side of society should also be feasible for the military side. In fact it should be even simpler for the military to follow what is environmentally sound and necessary. The military has exceptional market power. Often it is the only or the most important business partner for certain industries. Developments are generally made on the basis of tenders, not under free market conditions. The influence of the one who pays, generally the Ministries of Defense should be quite substantial. This demand power ideally should be used to make things that are environmentally necessary happen in practice.

#### **4. Conclusions**

Looking at the part of the conclusions of the study there are some indications on how to proceed with this study in the future that are missing. Integrated pollution prevention for the military means that the standards used by the military should, wherever possible, not differ from standards applicable to the civil parts of society. This seems to be the most important frame condition to look at. Although this is accepted in theory, there are doubts how this is done in practice.



Unless there are particular and very strong reasons for exceptions, the same environmental standards should apply for peacetime military activities as for comparable civil activities.

The first question that should be asked is: Is it necessary for the military to use special material specifications. This question does not seem to be asked too frequently.

Military production will of course follow military specifications. It is therefore essential that environmental concerns will be considered at a very early stage when the specifications are made and when the first proposals on how to follow the specifications are available.

A code of conduct on behalf of the military would help to stop unproductive developments and to avoid the production of systems which are in conflict with environmental concerns.

After the use of Agent Orange there are also concerns about the specifications of certain chemicals and weapons used in warfare. The latest of these concerns is the actual discussion on the use of depleted uranium munitions in the Kosovo Conflict and the impact these munitions had in the Gulf War. Of course, weapons are developed to harm, but it is clear that they should only do harm on the battlefield and insofar as possible avoid incidental damage.

For military equipment, supply and other activities a "cradle to grave" approach is needed based on an environmental impact assessment. Such an assessment shall consider all the foreseeable impacts of certain material and equipment throughout its life cycle, also taking its out-of-use fate (disposal) into consideration.

Bring military installations to an up-to-date status also environmentally in

- keeping emission standards
- upgrading fuel delivery, distribution and storage facilities and equipment.

Use bad experiences made with outdated systems for new systems to avoid making the same mistakes again. This is almost common sense.